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Cooperative State
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Office of
Grants and
Program Systems

SBIR-89-1

Program Solicitation

Small Business Innovation Research Program

Fiscal Year 1989

Closing Date: September 1, 1988

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USDA'S PROGRAM SOLICITATION SMALL BUSINESS INNOVATION RESEARCH FISCAL YEAR 1989

1.0 GENERAL PROGRAM DESCRIPTION

1.1 Introduction

The U.S. Department of Agriculture (USDA) invites science-based small business firms to submit research proposals under this program solicitation entitled "Small Business Innovation Research Program, Fiscal Year 1989." Firms with strong scientific research capabilities in any of the topic areas described in section 8.0 are encouraged to participate. USDA will support high-quality research or research and development (R&D) proposals containing advanced concepts related to important scientific problems and opportunities that could lead to significant public benefit if the research is successful.

Objectives of the Small Business Innovation Research (SBIR) program include stimulating technological innovation in the private sector, strengthening the role of small businesses in meeting Federal research and development needs, increasing private sector commercialization of innovations derived from USDA-supported research and development efforts, and fostering and encouraging participation by minority and disadvantaged small business firms in technological innovation. Questions of a general nature about this SBIR solicitation should be directed to:

Dr. Charles Cleland
SBIR Coordinator
Cooperative State Research Service
U.S. Department of Agriculture
901 D Street, S.W., Room 323
Washington, D.C. 20251-2200
Telephone: (202) 447-7002

1.2 Three-phase Program

This program solicitation is issued pursuant to the Small Business Innovation Development Act of 1982, Public Law 97-219, as amended (15 U.S.C. 638) and Section 630 of the Act making appropriations for Agriculture, Rural Development, and Related Agencies' programs for fiscal year ending September 30, 1987, and for other purposes, as made applicable by Section 101(a) of Public Law 99-591, 100 Stat. 3341.

This program is subject to the provisions found at 7 CFR Part 3403 (53 FR 21966, June 10, 1988). These provisions set forth procedures to be followed when submitting grant proposals, rules governing the evaluation of proposals and the awarding of grants, and regulations relating to the post-award administration of grant projects.

The program will be carried out in three separate phases. Under phase I, USDA anticipates making approximately 25 awards to small businesses during fiscal year 1989, with each award ranging up to \$50,000 for a period normally not to exceed 6 months. Phase I is to determine, if possible, the scientific or technical feasibility of ideas submitted by proposers on research topic areas described in section 8.0 of this solicitation. The phase I proposal should concentrate on research which will significantly contribute to **proving** the scientific or technical feasibility of the approach or concept and which would be a prerequisite to further USDA support in phase II.

Phase II awards will be made during fiscal year 1989 to firms with approaches that appear sufficiently promising as a result of phase I studies. **Only those small businesses previously receiving phase I awards in fiscal years 1987 and 1988 are eligible to submit phase II proposals in fiscal year 1989. Please note, however, that for each phase I project funded the awardee may apply for a phase II award only once.**

Phase I awardees in fiscal year 1988 who are unable to submit phase II proposals for valid reasons during the fiscal year 1989 funding cycle should apply for phase II support no later than the fiscal year 1990 funding cycle. A valid reason for not submitting the phase II proposal during the fiscal year 1989 funding cycle would be one which precludes completion of the phase I project within the designated award period. In such instances, the phase I awardee must write to the SBIR Coordinator outlining the circumstances which prevent completion of the project and requesting a no-cost extension of time. If the request is approved by USDA, the awardee is then eligible to apply for phase II support for the last time in the fiscal year 1990 funding cycle.

While USDA does not place upper and lower limits on phase II budget requests, the typical level of support for individual projects is expected to be in the \$150,000 to \$250,000 range, with most projects funded at about \$200,000, for a period normally not to exceed 24 months. It is anticipated that approximately one-half of phase I awardees will receive phase II grants, depending upon phase I results, the scientific and technical merit of the phase II proposal, and the availability of funds. Phase II is the principal research or research and development effort and will require a more comprehensive application, outlining the proposed effort in detail. At the appropriate time, the SBIR Coordinator will send a letter to all eligible phase I awardees requesting phase II proposals. The letter will provide instructions

for preparing phase II proposals and a deadline date for submitting applications. USDA recognizes that phase II awards may not necessarily complete the total research and development that may be required to satisfy commercial or Federal needs beyond the SBIR program. Therefore, completion of the research will probably have to be accomplished through phase III.

Phase III, to be conducted by the small business concern (including joint ventures and limited partnerships), will be privately funded by a non-Federal source through the use of a follow-on funding commitment. The purpose of phase III is to stimulate technological innovation and the national return on investment from research through the pursuit of commercial objectives resulting from the USDA-supported work carried out in phases I and II.

This program solicitation is for phase I proposals only. However, it also may be useful for phase II applicants because it contains many of the necessary forms, instructions for proposal preparation and submission, evaluation criteria, and other relevant information.

1.3 Follow-on Funding

In addition to supporting scientific research and development, another important goal of this program is to provide incentive and opportunity for small firms to convert USDA-sponsored research to technological innovation in the private sector. Proposers are asked to consider whether the research they are proposing to USDA also has commercial possibilities either for the proposed application or as a base for other applications. If it appears to have such potential, proposers are encouraged, on an optional basis, to obtain a contingent commitment for non-Federal follow-on funding to pursue further development of the commercial potential beyond the Government-funded research phases. Government funding pays for research relating to Federal objectives (phases I and II); non-Federal funding pays for development of commercial objectives (phase III).

The commitment for follow-on venture capital or other funding **must be obtained** by the proposer. It is understood that the commitment will be contingent upon the achievement of certain technical objectives mutually agreed upon between the small business and the provider of the follow-on capital. A few clearly defined and measurable objectives should be stated in the commitment agreement at the threshold level that would justify non-Federal investment if those technical objectives were achieved in phase II. The objectives do not have to be the same as those stated in the proposal, but they must be able to be accomplished within the scope of the proposed Government-funded research.

Proposers in phase I should briefly describe any potential commercial application(s) and whether or not the small business plans to secure follow-on non-Federal funding to pursue continuing development toward commercial objectives. To receive special consideration during the phase II review process, a signed contingent commitment between the small business and a non-Federal source should be submitted with the Phase II application. The commitment is optional but will receive special consideration as a point of merit in the review process where proposals are evaluated as being of approximately equal technical merit. **The maximum value (in phase II evaluation) will be given for a signed formal agreement with reasonable terms and funding equal to or in excess of the Federal investment requested in the phase II proposal.** The agreement should set forth the specific amount of phase III funds and should indicate the dates that such funds will be made available to the small business. Also, the agreement should contain a few specific technical objectives which, if achieved in phase II, will make the commitment usable by the small business. The terms cannot be contingent upon the obtaining of a patent, due to the length of time this process requires.

The commitment may be in the form of venture capital or a package including venture capital, contract research and development, joint venture, a research and development limited partnership, or other agreement with a non-Federal source. No amortization, repayment, or repurchase of commitment funds may be included during the phase II period of performance.

If desired, phase III funding may be advanced and invested during phase II to accelerate the research and development process.

1.4 Eligibility and Limitations

Each organization submitting a proposal must qualify as a small business for research purposes, must be the primary employer of the principal investigator at the time of award and during the conduct of the actual research, and must be the primary performer of the research and development effort (see definitions in section 2.0). In addition, the work must be performed by the small business concern in the United States.

A joint venture or a limited partnership is eligible to submit a proposal provided that the entity created qualifies as a small business in accordance with section 2[3] of the Small Business Act, 15 U.S.C. 632, and the definition found at subsection 2.2 of this solicitation.

2.0 DEFINITIONS

The following definitions apply for purposes of this solicitation:

2.1 Research or Research and Development

Research or research and development (R&D) means any activity which is:

- (A) A systematic, intensive study directed toward greater knowledge or understanding of the subject studied;
- (B) A systematic study directed specifically toward applying new knowledge to meet a recognized need; or
- (C) A systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

2.2 Small Business

Small business means a concern which **at the time of award** of phase I and phase II funding agreements meets the following criteria:

- (A) Is organized for profit, independently owned or operated, is not dominant in the field in which it is proposing, has its principal place of business located in the United States, has a number of employees not exceeding 500 (full-time, part-time, temporary, or other) in all affiliated concerns owned or controlled by a single parent concern, and meets the other regulatory requirements outlined in 13 CFR Part 121. Business concerns, other than licensed investment companies or State development companies qualifying under the Small Business Investment Act of 1958, 15 U.S.C. 661, et seq., are affiliates of one another when directly or indirectly (1) one concern controls or has the power to control the other; or (2) third parties (or party) control or have the power to control both. Control can be exercised through common ownership, common management, and contractual relationships. The term "affiliates" is defined in greater detail in 13 CFR 121.3(a). The term "number of employees" is defined in 13 CFR 121.2(b). Business concerns include, but are not limited to, any individual, partnership, corporation, joint venture, association, or cooperative.
- (B) Is at least 51 percent owned or, in the case of a publicly owned business at least 51 percent of its voting stock is owned, by United States citizens or lawfully admitted permanent resident aliens.

(C) Is the primary source of employment of the principal investigator of the proposed effort **at the time of award** and during the conduct of the proposed research. Primary employment means that more than one-half of the principal investigator's time is spent in the employ of the small business. Primary employment with the small business applicant precludes full-time employment with another organization. This requirement applies to both phase I and phase II awards.

(D) Is the primary performer of the proposed research effort. Because the program is intended to increase the use of small business firms in Federal research or R&D, the term "primary performer" means that a minimum of **two-thirds** of the research or analytical work must be performed by the proposing organization under **phase I grants**. For **phase II awards**, a minimum of **one-half** of the research or analytical effort must be conducted by the proposing firm.

2.3 Minority and Disadvantaged Small Business

A minority and disadvantaged small business is a concern:

- (A) Which is at least 51 percent owned by one or more minority and disadvantaged individuals or, in the case of any publicly owned business, one in which at least 51 percent of the voting stock is owned by one or more minority and disadvantaged individuals; and
- (B) Whose management and daily business operations are controlled by one or more such individuals.

For purposes of this solicitation, a minority and disadvantaged individual is defined as a member of any of the following groups: Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, or Asian-Indian Americans.

2.4 Women-owned Small Business

Women-owned small business means a concern that is at least 51 percent owned by a woman or women who also control and operate it. "Control" as used in this context means exercising the power to make policy decisions. "Operate" as used in this context means being actively involved in the day-to-day management of the concern.

2.5 United States

United States means the several states, the territories and possessions of the United States, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, and the District of Columbia.

2.6 Program Solicitation

A program solicitation is a formal request for proposals whereby an agency notifies the small business community of its research or R&D needs and interests in selected areas and invites proposals from small business concerns in response to these needs.

2.7 Subcontract

A subcontract is any agreement, other than one involving an employer-employee relationship, entered into by a Federal

Government funding agreement awardee calling for supplies or services required solely for the performance of the original funding agreement.

2.8 Funding Agreement

A funding agreement is any contract, grant, or cooperative agreement entered into between any Federal agency and any small business for the performance of experimental, developmental or research work funded in whole or in part by the Federal Government.

3.0 PROPOSAL PREPARATION

INSTRUCTIONS AND REQUIREMENTS

3.1 Proposal Requirements

This is a solicitation for **phase I research proposals on advanced concepts** from small businesses which have strong research capabilities in the basic and applied sciences.

The proposed research must be responsive to one of the USDA program interests stated in the research topic descriptions of this solicitation. However, the same research can often be the basis for technological innovation, new commercial products, processes, or services which benefit the public. This is a desirable economic objective, and such proposals are encouraged.

Proposals must cover only scientific research activities. **A small business must not propose product development, technical assistance, demonstration projects, classified research, or patent applications. Literature surveys should be conducted prior to preparing proposals for submission and must not be proposed as a part of the SBIR phase I or phase II effort. Proposals principally for the development of proven concepts toward commercialization or for market research should not be submitted,** since such efforts are considered the responsibility of the private sector and therefore are not supported by USDA.

A proposal must be limited to only one topic, the title of which must be entered on the cover sheet of the application. The same proposal may not be submitted under more than one topic. However, an organization may submit separate proposals on different topics or different proposals on the same topic under this solicitation. Where similar research is discussed under more than one topic, the proposer should choose that topic whose description appears most relevant to the proposer's research concept. Proposers may respond to any of the topics listed under

section 8.0 below. Research may be carried out through the construction and evaluation of a laboratory prototype, where necessary. **Duplicate proposals will be returned to the applicant without review.**

The purpose of a research proposal is to provide a written statement that contains sufficient information to persuade USDA, as well as members of the research community who review the proposal and advise USDA staff members, that the proposed research is a sound approach to an important scientific question and is worthy of support under the stated USDA evaluation criteria (see section 4.0).

The proposal should be self-contained and written with the care and thoroughness accorded papers for publication. Each proposal should be reviewed carefully by the applicant and by others knowledgeable on the subject to ensure inclusion of data essential for comprehensive evaluation.

The scientific or technical merit of the proposed research is the primary concern for all research supported by USDA. **The quality of the research proposal will be the principal basis upon which all proposals will be evaluated and selected for funding.**

3.2 General Content

This solicitation is designed to reduce the investment of time and cost to small business concerns in preparing formal proposals. Those who wish to respond should submit a research proposal of **no more than 25 pages**, including cover page, budget, and all **proposal-related** enclosures or attachments. The text must be prepared on only one side of the page using standard 8½" x 11" white paper, with no type smaller than elite regardless of whether it is single or double spaced. In the interest of equity to all proposers, no additional attachments, appendices, or references beyond the 25-page limitation will be con-

sidered in the proposal evaluation process, and proposals in excess of the 25-page limitation will not be considered for review or award. In addition, supplementary materials, revisions, and/or substitutions **will not be accepted after the due date for proposals**. Phase II proposals should be limited to no more than 50 pages.

It is not necessary to provide a lengthy discourse on commercial applications in the phase I proposal except to discuss them briefly under subsection 3.3(C), as appropriate, as well as under subsection 3.3(G)(1). The phase I proposal must be principally directed at feasibility-related research or R&D on the specific topic chosen.

3.3 Proposal Format

(A) **Cover Sheet** — Photocopy and complete Form CSRS-667 (appendix A) and use it as page 1 of the proposal. All pages must be consecutively numbered. The original of the cover sheet must at a minimum contain the pen-and-ink signatures of the proposed principal investigator(s) and the authorized organizational official. A submitting principal investigator whose signature does not appear on the cover sheet will not be listed as a principal investigator in the event of an award. A proposal which does not contain the signature of the authorized organizational official will not be considered a legal document and will be returned to the proposing small business without review. All other copies of the proposal must also contain a cover sheet but facsimile or photocopied signatures will be accepted. The title should be a brief (80-character maximum), clear, specific designation of the research proposed. It will be used to provide information to Congress and also will be used in issuing press releases. Therefore, it should not contain highly technical words. In addition, phrases such as "investigation of" or "research on" should not be used.

(B) **Project Summary** — Photocopy and complete Form CSRS-668 (appendix B) and use it as page 2 of the proposal. The technical abstract should include a brief description of the problem or opportunity, project objectives, and a description of the effort. Anticipated results and potential commercial applications of the proposed research also should be summarized in the space provided. Key words, to be provided in the last block on the page, should characterize the most important aspects of the project.

The information contained on Form CSRS-668, "Project Summary," of successful proposals will be published by USDA and, therefore, should not contain proprietary information.

(C) **Technical Content** — Begin the main body of the proposal on page 3 and include:

- (1) **Identification and Significance of the Problem or Opportunity** — Clearly state the specific technical problem or opportunity addressed and its importance.
- (2) **Background and Rationale** — Indicate the overall background and technical approach to the problem or opportunity and the part that the proposed research plays in providing needed results.
- (3) **Relationship with Future Research or Research and Development** — Discuss the significance of the phase I effort in providing a foundation for the phase II R&D effort. State the anticipated results of the approach if the project is successful (phases I and II). This should address: (a) the technical, economic, social, and other benefits to the Nation and to users of the results such as the commercial sector, the Federal Government, or other researchers; (b) the estimated total cost of the approach relative to benefits; and, if appropriate, (c) any specific policy issues or decisions which might be affected by the results.
- (4) **Phase I Technical Objectives** — State the specific objectives of the research or research and development effort, including the technical questions it will try to answer to determine the feasibility of the proposed approach.
- (5) **Phase I Work Plan** — This work plan must provide an explicit, detailed description of the research or research and development approach. The plan should indicate the tasks to be performed as well as how and where the work will be carried out. The phase I effort should attempt to determine the technical feasibility of the proposed concept. The work plan should be linked with the technical objectives of the research and the questions the effort is designed to answer. Therefore, it should flow logically from 3.3(C)(4) above. **This section should constitute a substantial portion of the total proposal.**
- (6) **Related Research or Research and Development** — Describe significant research or R&D activities from relevant literature that are directly related to the proposed effort, including any conducted by the principal investigator or by the proposing small business, how it relates to the proposed effort, and any planned coordination with outside sources.

The proposer must persuade reviewers that he or she is aware of related research in the selected subject.

(D) Key Personnel and Bibliography — Identify key personnel involved in the effort, including information on their directly related education and experience. For each key person, provide a chronological list of the most recent representative publications in the topic area during the preceding five years, including those in press. List the authors (in the same order as they appear on the paper), the full title, and the complete reference as these usually appear in journals. Where vitae are extensive, summaries that focus on the most relevant experience or publications may be necessary to meet the proposal size limitation in phase I.

(E) Facilities and Equipment — Describe the types, location, and availability of instrumentation and physical facilities necessary to carry out the work proposed. Items of equipment to be purchased must be fully justified under this section.

(F) Consultants — Involvement of university or other consultants in the planning and research stages of the project is permitted and may be particularly helpful to small firms which have not previously received Federal research awards. If such involvement is intended, it should be described in detail. Proposals should include letters from proposed consultants indicating willingness to serve (see subsection 4.3(D) or 4.4(E), as appropriate).

(G) Potential Post Application — Briefly describe:

- (1) Whether and by what means the proposed research appears to have potential commercial application; and
- (2) Whether and by what means the proposed research appears to have potential use by the Federal Government.

(H) Current and Pending Support — If a proposal, substantially the same as the one submitted in response to this solicitation, has been previously funded or is currently funded, pending, or about to be submitted to another Federal agency or to USDA in a separate action, the proposer must provide the following information:

- (1) Name and address of the agency(s) to which a proposal was submitted, or will be submitted, or from which an award is expected or has been received.
- (2) Date of actual or anticipated proposal submission or date of award, as appropriate.

(3) Title of proposal or award, identifying number assigned by the agency involved, and the date of program solicitation under which the proposal was submitted or the award was received.

(4) Applicable research topic area for each proposal submitted or award received.

(5) Title of research project.

(6) Name and title of principal investigator for each proposal submitted or award received.

USDA will not make awards that duplicate research funded (or to be funded) by other Federal agencies.

(I) Cost Breakdown on Proposal Budget — Photocopy and complete Form CSRS-55 (appendix C) only for the **phase under which you are currently applying**. (An applicant for phase I funding should not submit both phase I and phase II budgets.) Please note the following in completing the budget:

(1) Salaries and Wages — Indicate the number and kind of personnel for whom salary support is sought. For key personnel, also indicate the number of work months of involvement to be supported with USDA funds (see blocks labeled "CSRS Funded Work Months").

(2) Equipment and Travel — Performing organizations are expected to have appropriate facilities, suitably furnished and equipped. However, items of equipment may be requested provided that they are specifically identified and adequately justified (see item (E) of this section). Equipment is defined as an article of nonexpendable, tangible personal property having a useful life of more than 2 years and an acquisition cost of \$500 or more per unit. **Vesting** of title to equipment purchased with funds provided under an SBIR funding agreement will be **determined by USDA**. **Awardees should plan to lease expensive equipment. Foreign travel may not be included in the phase I budget** but may be included as necessary in phase II proposals. The inclusion of either equipment or foreign travel will be carefully reviewed with respect to need and appropriateness for the research proposed.

(3) Subcontracting Limits — Subcontracting as defined in the program solicitation may not exceed one-third of the research or analytical effort during phase I and one-half of the research or analytical effort during phase II. In addition, subcontractors must perform their portion of the work in the

United States. If subcontracting costs are anticipated, they should be indicated in block I., "All Other Direct Costs," on the budget sheet. A breakdown of subcontractual costs is required. **NOTE: For proposals involving subcontractual or consulting arrangements, USDA strongly encourages the applicant to submit an agreement or letter of intent signed by the subcontractor or consulting firm's authorized organizational official** (see subsection 4.3(D) or 4.4(E), as appropriate).

- (4) **Fee** — A reasonable fee is permitted under this program solicitation but proposers are encouraged to minimize fee requests due to the small amount of funds available. **All fees are subject to negotiation with USDA.** If a fee is requested, the amount should be indicated in block I., "All Other Direct Costs," on the budget sheet.
- (5) **Indirect Costs** — If available, the current rate negotiated with the cognizant Federal negotiating agency should be used. If no rate has been negotiated, a reasonable dollar amount in lieu of indirect

costs may be requested, which will be subject to approval by USDA. A proposer may elect not to charge indirect costs and, instead, use all grant funds for direct costs. If a negotiated rate is used, the percentage and base should be indicated in the space allotted under item K. on the budget sheet. If indirect costs are not charged, the phrase "None requested" should be written in this space.

- (J) **Organizational Management Information** — Before the award of an SBIR funding agreement, USDA requires the submission of certain organizational management and financial information to assure the responsibility of the proposer. This information is not required unless a project is recommended for funding and is submitted on a one-time basis only. The phase I applicant has the option of submitting this information with the proposal or at the time he or she is notified that the project has been recommended for funding. If the applicant chooses to provide this information with the proposal, only one set of these materials should be submitted, and it should be attached to the original copy of the proposal. (See subsection 5.14(B) and appendixes D and E of this solicitation.)

4.0 METHOD OF SELECTION AND EVALUATION CRITERIA

4.1 Introduction

Phase I and phase II proposals will be judged competitively in a two-stage process, based primarily upon scientific or technical merit. First, each proposal will be screened by USDA scientists to ensure that it is responsive to stated requirements contained in this solicitation (see subsection 4.2). Proposals found to be responsive will be technically evaluated by peer scientists knowledgeable in the appropriate scientific field using the criteria listed in subsection 4.3 or subsection 4.4, as appropriate. Each proposal will be judged on its own merits.

Unsolicited proposals or proposals not responding to research topic areas outlined in section 8.0 of this program solicitation are not eligible to be considered for a phase I SBIR award and, hence, will be returned to the proposing firm without review.

Both internal and external peer reviewers may be used during the technical evaluation stage of this process. Selections will be made from among recognized specialists who are uniquely qualified by training and experience in their respective

fields to render expert advice on the merit of proposals received. It is anticipated that such experts will include those located in universities, Government, and non-profit research organizations but not in concerns organized for profit. If possible, USDA intends that peer review groups shall be balanced with minority and female representation and with an equitable age distribution.

Final decisions will be made by USDA based upon the ratings assigned by reviewers and consideration of other factors, **including the potential commercial application**, possible duplication of other research, any critical USDA requirements, program balance, and budget limitations. In addition, the follow-on funding commitment will be a consideration for phase II proposals. There is no commitment by USDA to fund any particular proposal, to support any specific number of proposals in a given research topic area, or to make a specific number of awards under either phase I or phase II. USDA also may elect to fund several or none of the proposed approaches to the same topic. Care will be taken to avoid actual and potential conflicts of interest among reviewers. Evaluations will be confidential to USDA staff members, peer reviewers, and the proposed principal investigator(s), to the extent permitted by law.

4.2 Initial Screening Criteria

To avoid misunderstanding, applicants should be aware that **proposals not satisfying all of the screening criteria may be returned to the proposing small business without review. Returned proposals may not be resubmitted** (with or without revision) **under this solicitation.** The initial screening criteria are the following:

- (A) The proposing firm must qualify as a small business as defined in subsection 2.2.
- (B) The phase I proposal, including cover page, budget page, and proposal related attachments, **may not exceed 25 pages in length**, regardless of type size or spacing. **Phase I proposals exceeding this 25-page limit will be returned without review.** The phase II proposal should not exceed 50 pages in length.
- (C) Phase I proposals must be limited to one topic; however, a small business is free to submit several different proposals, each covering different approaches or topics. **Duplicate proposals will be returned without review.**
- (D) Phase I proposal budgets, including subcontracts, consultant charges, indirect costs, and fees, should not exceed \$50,000. Phase II budgets, including all proposed costs, should not exceed \$250,000.
- (E) The proposed duration of phase I projects should not exceed 6 months, except in unusual, justified circumstances, and the duration of phase II proposals should not exceed 24 months.
- (F) The principal investigator's primary employment, that is, more than **one-half time**, must be with the small business concern at the time of award and during the conduct of the research. Primary employment with the applicant small business precludes full-time employment with another organization. (See subsection 2.2(C).) In addition, the work must be performed in the United States (see subsection 1.4).
- (G) A minimum of two-thirds of the research and/or analytical effort under each SBIR phase I proposal must be carried out by the proposing firm, while a minimum of one-half of the research and/or analytical effort must be carried out by the proposing firm under phase II.
- (H) **Foreign travel may not be included in phase I budgets** but may be included as necessary in phase II budgets.
- (I) Proposals must cover scientific research activities only (see subsection 3.1).

- (J) The proposed phase I research must fall within a solicited topic area. (See section 8.0 for the listing of research topic descriptions.)
- (K) A proposal must contain adequate information to be reviewed as research. **USDA reserves the right not to submit for review any proposal which it finds to have insufficient information.**

4.3 Phase I Evaluation Criteria

USDA plans to select for award those proposals offering the best value to the Nation with approximately equal consideration given to each of the following criteria, **except for item (A) which will receive twice the value of any of the other items:**

- (A) **The scientific/technical** quality of the phase I research plan and its relevance to the stated objectives, with special emphasis on innovativeness and originality.
- (B) **Importance of the problem or opportunity and anticipated benefits** of the proposed research, if successful.
- (C) **Adequacy of the phase I objectives** to show incremental progress toward proving the feasibility of approach.
- (D) **Qualifications of the principal investigator(s)**, other key staff and consultants, and the probable adequacy of available or obtainable instrumentation and facilities.

4.4 Phase II Evaluation Criteria

A phase II proposal may be submitted **only** by a phase I awardee. The phase II proposal will be reviewed for overall merit based on the following criteria with each item receiving approximately equal weight, **except for item (A) which will receive twice the value of any of the other items:**

- (A) The scientific/technical quality of the proposed research, with special emphasis on innovativeness and originality.
- (B) Degree to which phase I objectives were met.
- (C) The technical, economic, and/or social importance of the problem or opportunity and anticipated benefits if phase II research is successful.
- (D) The adequacy of the phase II objectives to meet the problem or opportunity.
- (E) The qualifications of the principal investigator(s) and other key personnel to carry out the proposed work.

- (F) Reasonableness of the budget requested for the work proposed.

In the event that two or more proposals are of approximately equal technical merit, the follow-on funding commitment for continued development in phase III will be an important consideration. The value of the commitment will depend upon the degree of commitment made by non-Federal investors, with the **maximum value resulting from a signed agreement with reasonable terms for an amount at least equal to the funding requested from USDA in phase II.**

4.5 Notice to Proposers

Technical reviewers will base their conclusions and recommendations on information contained in the phase I or phase II pro-

posal. It cannot be assumed that reviewers are acquainted with any experiments referred to within a proposal, with key individuals, or with the small business itself.

After final decisions have been announced, written reviews of the proposal will be sent to the proposed principal investigator(s) involved, but the reviews will not include the identities of the reviewers. Due to funding limitations and USDA's desire to support as many worthwhile projects as possible, it may be necessary for USDA to reduce the amount of an award below the amount requested by a small business (or to fund only certain objectives outlined in the proposal). Any significant changes will be discussed with the proposing firm, which may then be asked to submit a revised budget reflecting the reduced amount. In the event that this occurs, specific instructions will be provided to the proposer.

5.0 CONSIDERATIONS

5.1 Awards

USDA expects to make approximately 25 phase I awards ranging up to \$50,000 each to small businesses in fiscal year 1989, depending upon the availability of funds. Awards will be made no later than September 30, 1989. USDA will announce the names of those concerns receiving awards, and successful proposers will then normally have 6 months after awards are made to carry out their proposed phase I effort.

It is anticipated that approximately 12 of the fiscal year 1988 phase I awardees will receive phase II awards, depending upon the results of the phase I efforts and the availability of funds. Phase II awards are expected to range between \$150,000 and \$250,000 with most projects funded at about \$200,000. The purpose of phase II is to further develop ideas explored under phase I.

In accordance with the guidelines contained in 31 U.S.C. 6301-6308, and the authority contained in Section 630 of the Act making appropriations for Agriculture, Rural Development, and Related Agencies' programs for fiscal year ending September 30, 1987, and for other purposes, as made applicable by Section 101(a) of Public Law 99-591, 100 Stat. 3341, **all phase I and phase II awards will be issued as research grants.** Small fees (i.e., estimated profit) will be permitted under both phases of this program.

5.2 Reports

An original and two copies of a comprehensive final performance report on the phase I SBIR project must be submitted within 30 days following expiration of the grant. The report should include a single-page project summary as the first page. This summary should include the purpose of the research, a brief

description of the research carried out, the research findings or results, and, in a final paragraph, potential applications (commercial or other) of the research. The balance of the report should include a comparison of actual accomplishments with the goals established for the grant; the reasons for slippage if established goals were not met; estimates of technical feasibility; and additional pertinent information such as an explanation of cost over-runs or unexpectedly high unit costs. In addition, please identify all other recipients (public and private) of the research results documented in the phase I report. This report should be submitted to:

Dr. Charles Cleland
SBIR Coordinator
Cooperative State Research Service
U.S. Department of Agriculture
901 D Street, S.W., Room 323
Washington, D.C. 20251-2200
Telephone: (202) 447-7002

A final "Financial Status Report" (SF-269) is due within 90 days after the expiration date of the grant and should be submitted to the Cooperative Funds Division at the address listed below, in accordance with instructions contained in Section 3015.82 of the Uniform Federal Assistance Regulations.

Mr. Garland Hearce
Director, Cooperative Funds Division
Cooperative Management Staff, Extension Service
U.S. Department of Agriculture
901 D Street, S.W., Room 320
Washington, D.C. 20251-0900
Telephone: (202) 447-9527

5.3 Payment Schedules

Payments will be made to the recipient either by advance or reimbursement Treasury Check. The specific method and frequency of payment, as well as required forms and pertinent submission instructions for each project, will be provided to the small business concern when the funding agreement is forwarded to it for acceptance.

5.4 Proprietary Information

Information contained in unsuccessful proposals will remain the property of the proposer. However, USDA will retain for one year one file copy of all proposals received; extra copies will be destroyed. Public release of information for any proposal submitted will be subject to existing statutory and regulatory requirements.

If a proposal contains proprietary information that constitutes a trade secret, proprietary commercial or financial information, confidential personal information, or data affecting the national security, it will be treated in confidence to the extent permitted by law, provided the information is clearly marked by the proposer with the term "confidential proprietary information" and provided the following legend also appears in the designated area at the bottom of the proposal's cover sheet (see appendix A):

"For any purpose other than to evaluate the proposal, this data shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part; provided that if a funding agreement is awarded to this proposer as a result of, or in connection with, the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the funding agreement. This restriction does not limit the Government's right to use information contained in the data if it is obtained from another source without restriction. The data subject to this restriction is contained in pages _____ of this proposal."

Any other legend may be unacceptable to USDA and may constitute grounds for returning the proposal without further consideration and without assuming any liability for inadvertent disclosure. To the extent authorized by law, USDA will limit dissemination of such information to its employees and to external reviewers for the purpose of evaluating the proposal.

The inclusion of proprietary information is discouraged unless it is necessary for the proper evaluation of the proposal. The proprietary information included should be limited, set off on a separate page, and keyed to the text by numbers. It should be confined to a few critical technical items, which, if disclosed, could jeopardize the obtaining of foreign or domestic patents. Also, trade secrets, salaries, or other information which could

jeopardize commercial competitiveness should be keyed and set off on a separate page. Proposals or reports which set off any large amount of information may be found unacceptable by USDA.

Since technical reports by the principal investigator(s) may be made available to the public, such reports shall not contain any restrictive language purporting to limit their use other than that which is set off on a proprietary page. However, USDA, to the extent permitted by law, normally will honor a request to delay release of the report for 6 months, or longer if reasonable, so the proposer may seek patent protection or follow-on funding where appropriate.

5.5 Rights in Technical Data

Rights in technical data, including software developed under the terms of any funding agreement resulting from a proposal submitted in response to this solicitation, shall remain with the grantee. However, the Government shall have the limited right to use such data for Governmental purposes and shall not release such data outside the Government without permission of the grantee for a period of two years from completion of the project under which the data were generated. Effective at the conclusion of the two-year period, the Government shall retain a royalty-free license for Governmental use of any technical data delivered under the agreement, whether patented or not.

5.6 Copyrights

With prior written permission of the Authorized Departmental Officer, the grantee normally may copyright and publish (consistent with appropriate national security considerations, if any) material developed with USDA support. USDA receives a royalty-free license for the Federal Government and requires that each publication contain the following acknowledgment and disclaimer statement:

"This material is based upon work supported by the U.S. Department of Agriculture under Grant No. (awardee should enter agreement number here). Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the U.S. Department of Agriculture."

The last sentence may be omitted from articles published in scientific journals.

5.7 Patents and Inventions

Allocation of rights to inventions shall be in accordance with 35 U.S.C. 202-206 and the final rule published in the *Federal Register* (52 FR 8552-8563) by the Department of Commerce entitled "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms" (37 CFR Part 401). These

regulations provide that small businesses normally may retain the principal worldwide patent rights to any invention developed with USDA support. USDA receives a royalty-free license for Federal Government use, reserves the right to require the patentee to license others in certain circumstances, and requires that anyone exclusively licensed to sell the invention in the United States must normally manufacture it domestically. To the extent authorized by 35 U.S.C. 205, USDA will not make public any information disclosing a USDA-supported invention for a two-year period to allow the grantee a reasonable time to file an initial patent application. Additional information may be obtained by contacting:

Mr. M. Howard Silverstein
Deputy Assistant General Counsel
for Patents
Office of the General Counsel, USDA
Room 2332, South Building
14th & Independence Avenue, S.W.
Washington, D.C. 20250

5.8 Cost Sharing

Cost sharing is permitted for proposals under this program solicitation; however, cost sharing is not required nor will it be an evaluation factor in considering the competitive merit of proposals submitted.

5.9 Profit or Fee

Fees will be allowed under both phase I and phase II awards. However, because of the limited amount of funds available, proposers are encouraged to keep such fees to a minimum.

5.10 Joint Ventures and Limited Partnerships

Joint ventures and limited partnerships are eligible to apply for and to receive research grants under this program solicitation, provided that the entity created qualifies as a small business as defined in subsection 2.2. (Unless the joint venture arrangement contains legally documented confirmation that it can act as a single entity, any resulting award will be issued to only one of the small businesses involved, with the others acting as either subcontractors or consultants.)

5.11 Research and Analytical Work

- (A) For phase I a minimum of two-thirds of the research and/or analytical effort must be performed by the proposing firm unless otherwise approved in writing by the Authorized Departmental Officer.
- (B) For phase II a minimum of one-half of the research and/or analytical effort must be performed by the proposing firm.

5.12 Research Involving Special Considerations

A number of situations frequently encountered in the conduct of scientific research require the submission of special information for a particular project. Since some types of research targeted for SBIR support have high probability of involving either recombinant deoxyribonucleic acid (DNA) molecules or human subjects at risk, special instructions follow.

If the proposed research will involve either recombinant DNA molecules or human subjects at risk, the proposal must so indicate. Further, in the event that the project is funded, the proposer may be required to have the research plan reviewed and approved by an appropriate "Institutional Review Board" prior to commencing actual substantive work. It is suggested that proposers contact local universities, colleges, or nonprofit research organizations which have established such reviewing mechanisms to have this service performed. (Appropriate instructions will be forwarded to awardees whose projects involve recombinant DNA molecules or human subjects at risk when the funding agreement is transmitted for acceptance.)

Guidelines to be applied and observed when conducting such research are outlined below.

- (A) **Recombinant DNA Molecules** — Principal investigators and authorized organizational officials must comply with the "Guidelines for Research Involving Recombinant DNA Molecules" issued by the National Institutes of Health. See 51 FR 16958 - 16985 and any subsequent revisions.)
- (B) **Human Subjects at Risk** — Guidelines to be used in safeguarding the rights and welfare of human subjects used in research supported with USDA grant funds are contained in Public Law 93-348, as implemented by Part 46, Subtitle A of Title 45 of the Code of Federal Regulations, as amended (45 CFR Part 46), issued by the Department of Health and Human Services.

5.13 Grantee Commitments

Upon issuance of a research grant by USDA, the awardee will be required to make certain legal commitments through acceptance of numerous clauses in the phase I or phase II funding agreement. Most of these clauses are contained in USDA's Uniform Federal Assistance Regulations, 7 CFR Part 3015, which will be incorporated into all awards resulting from this program solicitation and will be mailed in the package of materials when the research grant is forwarded to the awardee for acceptance. These regulations primarily consolidate internal policies and procedures relating to USDA's assistance programs and implement various Federally issued assistance policies, including applicable Federal cost principles and uniform ad-

ministrative requirements. Advance copies of these regulations are available upon request.

The following clauses illustrate the types of terms and conditions a small business concern will be asked to accept if awarded a research grant under this program. This is not a complete listing nor the exact wording of the clauses as they will appear in the funding agreement.

- (A) **Standards of Work** — Work performed under the grant must conform to high professional standards. Responsibility for performance of the principal investigator(s) and other employees or consultants who carry out the work lies with the management of the organization receiving the award.
- (B) **Inspection** — Work performed under the grant is subject to Government inspection and evaluation at all times.
- (C) **Examination of Records** — The Comptroller General (or a duly authorized representative) shall have the right to examine any directly pertinent records of the grantee involving transactions related to the funding agreement.
- (D) **Termination for Cause** — USDA may terminate the funding agreement in whole, or in part, if the grantee fails materially to perform the work for which the funding agreement is issued or otherwise fails to comply with the terms of the grant.
- (E) **Termination by Mutual Agreement** — The grant may be terminated in whole, or in part, when both parties agree that the continuation of the project would not produce beneficial results commensurate with the further expenditure of funds.
- (F) **Equal Opportunity** — The grantee shall not discriminate against any employee or applicant for employment because of race, color, religion, age, sex, national origin, physical or mental handicap, or status as a veteran of the Vietnam era.

5.14 Additional Information

- (A) This program solicitation is intended for informational purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting SBIR funding agreement, the terms of the funding agreement are controlling.
- (B) Before the award of an SBIR funding agreement, USDA requires the submission of certain organiza-

tional management, personnel, and financial information to assure responsibility of the proposer, including certification that the proposing organization is in compliance with the Civil Rights Act of 1964. Form CSRS-666 (see both sides of appendix D) should be used to provide the necessary organizational information, and Form CSRS-665 (see appendix E) should be used to certify compliance with Title VI of the Civil Rights Act of 1964. (If portions of the information requested on Form CSRS-666 are not applicable to the proposing organization or entity, "N/A" should be written in the space provided.) The information contained in both forms must be submitted **on a one-time basis only** to the address shown in subsection 6.3. (If sufficient changes occur within the organization to warrant submission of new or additional information, revised forms should be forwarded in the same manner.) It is anticipated that nearly all phase I awardees will be required to submit the above information, but phase II awardees will be concerned primarily with submitting new forms **only** if they have undergone significant changes in organization, personnel, or policies relating to civil rights. **Phase II awardees will be asked to submit an updated statement of financial condition.**

Although this information is not required unless a project is recommended for funding, it would be helpful if Forms CSRS-665 and CSRS-666 were submitted along with the proposal. Only one set of these materials should be submitted and it should be attached to the original copy of the proposal. **Management information will not be counted as part of any page limitations specified elsewhere in this program solicitation.**

- (C) USDA is not responsible for any monies expended by the proposer prior to the award of any funding agreement.
- (D) This program solicitation is not an offer by USDA and does not obligate USDA to make any specific number of awards. Also, awards under this program are contingent upon the availability of funds.
- (E) **Unsolicited proposals will not be accepted** under the SBIR program in either phase I or phase II.
- (F) If an award is made under this program solicitation, the grantee will be required to certify that it has not previously been, nor is currently being, paid for essentially equivalent work by **any agency** of the Federal Government.

6.0 SUBMISSION OF PROPOSALS

6.1 Deadlines for Proposals

All phase I proposals must be postmarked or delivered to the address shown in subsection 6.3 by **September 1, 1988**. Proposals not postmarked or delivered by this date will be returned to the proposing organization without evaluation or consideration for award.

All phase II proposals must be postmarked or delivered to the address shown in the letter requesting phase II proposals by **January 16, 1989**. Proposals not postmarked or delivered by this date will be returned to the proposing organization without evaluation or consideration for award. Only those small businesses previously receiving phase I awards in fiscal years 1987 and 1988 are eligible to submit phase II proposals in fiscal year 1989. The SBIR Coordinator will send a letter to all eligible phase I awardees requesting phase II proposals.

For the convenience of all potential proposers, the following schedule is provided for informational purposes:

Phase I

Proposal postmark or delivery	by September 1, 1988
Notification of awards and declinations	approximately March 1, 1989
Period of research performance	May 15, 1989 - November 30, 1989
Final Report due at USDA	December 31, 1989

Phase II

Proposal postmark or delivery	by January 16, 1989
Notification of awards and declinations	approximately May 1, 1989
Beginning of period of research performance	approximately June 1, 1989

6.2 Number of Copies

Proposers under phase I are requested to submit an original and 14 copies of all proposals. These proposals must contain all of the information, **arranged in the same order**, as that outlined in section 3.0. Proposers under phase II are requested to submit an original and 9 copies of all proposals.

6.3 Address

All proposals, whether phase I or phase II, should be mailed or delivered to:

Proposal Services Unit
Grants Administrative Management
Cooperative State Research Service
U.S. Department of Agriculture
901 D Street, S.W., Room 303
Washington, D.C. 20251-2200

6.4 Acknowledgment of Proposals

All proposals will be acknowledged. The acknowledgment will be issued in the form of a letter and, at a minimum, will contain the title of the proposed project, proposal number assigned by USDA, and date of receipt. Later inquiries, submissions of addenda prior to the applicable deadline for proposals, and the like should include this information.

6.5 Bindings

Do not use special bindings or covers on proposals submitted in response to this program solicitation. Staple all pages together securely in the upper left-hand corner of each copy of each proposal.

6.6 Packaging

If possible, the original and all copies of each proposal should be mailed in one package. Due to the volume of proposals received, applications submitted in several packages are very difficult to identify and track. If it becomes necessary to mail copies of a proposal in more than one package, the number of packages should be marked on the outside of each. It is important that **all packages be mailed at the same time**.

6.7 Questions Pertaining to the USDA SBIR Program or to this Solicitation

Written or verbal questions of a general nature about the USDA SBIR program, as well as general questions pertaining to this solicitation (but **not** pertaining to requests for additional copies of the solicitation), should be directed to:

Dr. Charles Cleland
SBIR Coordinator
Cooperative State Research Service
U.S. Department of Agriculture
901 D Street, S.W., Room 323
Washington, D.C. 20251-2200
Telephone: (202) 447-7002

6.8 Requests for Additional Copies of this Solicitation

Additional copies of this solicitation may be ordered by writing to the address shown in subsection 6.3 or by calling (202) 475-5048.

6.9 Information on Proposal Status

It is anticipated that the evaluation of **phase I** proposals and the award of research grants will be made approximately 6 months from **September 1, 1988**, and no information on proposal status will be available until final selections have been made. Both successful and unsuccessful proposers will be notified of final award decisions within approximately 6 months.

Evaluation of **phase II** proposals and the award of research grants will require approximately four months from **January 16, 1989**. Again, proposers are discouraged from making inquiries regarding the status of their proposals. All proposing organizations will be notified of final award decisions within approximately 4 months.

7.0 SCIENTIFIC AND TECHNICAL INFORMATION SOURCES

Listed below are some of the sources that can provide technology search and document services which may be useful in preparing SBIR proposals. They can be contacted directly for service and cost information.

National Agricultural Library
Reference Staff
U.S. Department of Agriculture
Beltsville, Maryland 20705
(301) 344-4479

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161
(703) 487-4600

Aerospace Research Applications Center
P.O. Box 647
Indianapolis, Indiana 46223
(317) 264-4644

Kerr Industrial Applications Center
Southeastern Oklahoma State University
Durant, Oklahoma 74701
(405) 924-6822

NASA/Florida State Technology Applications Center
State University System of Florida
500 Weil Hall
Gainesville, Florida 32611
(904) 392-6626

North Carolina Science and Technology Research Center
P.O. Box 12235
Research Triangle Park, North Carolina 27709
(919) 549-0671

NASA Industrial Applications Center
701 LIS Building
University of Pittsburgh
Pittsburgh, Pennsylvania 15260
(412) 624-5211

NASA/UK Technology
109 Kinkead Hall
University of Kentucky
Lexington, Kentucky 40506
(606) 257-6322

8.0 RESEARCH TOPIC DESCRIPTIONS

SBIR proposals are solicited from the full range of topic areas that follow. Specific subtopics are listed only as **examples** of advanced applications or basic research of interest to USDA and are **not to be interpreted as exclusive**. It is USDA's intention to provide sufficient flexibility to obtain the greatest degree of creativity and innovation possible, consistent with overall SBIR and USDA program objectives. USDA reserves the right to shift proposals to a more appropriate topic when necessary for adequate review.

8.1 Forests and Related Resources

(A) Scope of Research

The objective of this topic is to develop environmentally sound techniques to increase productivity of forest land and to increase the utilization of materials and resources from forest lands. These areas deal with (1) increasing growth and yield through improving planting stock, reducing pathogens and insects, improving the soil or reducing harvesting impacts, and developing means to ensure survival of newly planted trees; (2) increasing the utility of the material grown in the forest through improving lumber yield from trees, utilizing greater percentages of trees, and using residues from forest and wood manufacturing systems; (3) reducing ecological insults from forest operations; and (4) developing new products or technologies to increase the use of wood.

(B) Suggested Subtopics

Appropriate subtopics for innovative research proposals from small business concerns include, but are not limited to, the following:

(1) Growth and yield

- Improving growing stock, tissue culture, genetic manipulation or vegetative reproduction of forest trees and other means of increasing the regenerative abilities of forests.
- Reducing pathogens and insects — The volume of material lost to disease and insects exceeds that used for lumber and associated wood products. Subjects applicable here are those that reduce the impact of destructive agents.
- Improving soil or reducing harvesting impacts — The fixing of nitrogen by symbiotic agents through genetic manipulation or by mycorrhizae to increase forest productivity through nitrogen enrichment of forest soils;

research to reduce soil erosion, compaction, or other alterations caused by harvesting or forest operations (that is, physical improvement of forest soils).

- Developing systems to increase the survival of newly planted trees through mechanical, physical, or chemical means that are environmentally safe.

(2) Increasing the utility of forest-grown material

- Improving lumber yield or other means of increasing the volume and worth of wood from individual trees.
- Utilizing a greater percentage of the tree through improved or new techniques of veneering or comminution so that new or improved reconstituted products can be made.

(3) Reducing ecological insults by forest operations

— Research which provides for the economic recovery of resources from forests while raising potential productivity and reducing impacts to the ecological structure of the area of operation.

(4) Developing new products or technologies to increase the use of wood

— Products using wood as a basic component of systems to replace or compete with construction materials or techniques.

8.2 Plant Production and Protection

(A) Scope of Research

The objective of this topic is to examine means of enhancing crop production by reducing the impact of destructive agents, developing effective crop systems that are economically and environmentally sound, enhancing the impact of new methods of plant manipulation, and developing new crop plants and new uses for existing crops.

(B) Suggested Subtopics

Examples of research activities that would be appropriate for small business concerns include, but are not limited to, the following:

- (1) **Plant production** — Improving the efficiency of crop production by utilizing innovative methods such as those of biotechnology, molecular genetics, and tissue culture and embryogenesis; developing improved methods and equipment for planting, growing, and harvesting crop plants; and

developing new crop plants (both terrestrial and aquatic) as sources of food, fiber, or industrial products.

- (2) **Plant protection** — Reducing the impact of plant pathogens and insect pests on crop plants; increasing plant resistance to plant pathogens and insect pests; and developing efficient and environmentally safe pesticide and herbicide usage equipment.
- (3) **Plant utilization** — Developing new products or technologies to increase the use of major crop plants.
- (4) **Energy conservation** — Developing crop management systems, farm structures, and waste utilization for efficient use of energy.

8.3 Animal Production and Protection

(A) Scope of Research

The overall objective of this topic area is to develop knowledge that will enable producers of food animals (both terrestrial and aquatic) to increase production efficiency and to assure a reliable, safe supply of animal protein and other animal products while conserving resources and reducing costs of production. Some examples of the areas of research to be supported are: clarification of the nutritional requirements of food animals for improved growth and feed efficiency; determination of hormonal and cellular mechanisms which control reproduction and multiple births; clarification of genetic processes that result in food animals with superior characteristics; improved methods of disposal of animal wastes; and diagnosis, treatment and control of food animal diseases, parasitisms and other animal health hazards.

(B) Suggested Subtopics

Appropriate subtopics for innovative research proposals from small business concerns include, but are not limited to, the following:

(1) Animal Production

- (a) **Animal nutrition and digestive physiology** — Research directed at understanding the interrelationships between alimentary microbial ecosystems, digestive processes, and the host animal, and providing nutritional characterization of feedstuffs and integrated nutrient management to enhance production efficiency.

- (b) **Animal reproduction** — Research on the control of estrus, ovulation and fertilization; enhanced embryo survival and development; enhanced parturition and perinatal survival; and advances in embryo technology such as sex control, twinning, frozen embryos and cloning.

- (c) **Animal genetics and breeding** — Studies aimed at germplasm improvement in food animals that will provide animals with superior characteristics in areas such as reproduction, growth and development, lactation and egg production, lean-to-fat ratios, and disease resistance.

- (d) **Livestock management systems** — Development of systems or processes that can be applied to food animal production enterprises that will provide greater efficiency in the production process.

(2) Animal Protection

- (a) **Diagnostic tests** — Development of diagnostic tests for specific diseases and agricultural chemicals which pose a health hazard to food animals and a residue problem in animal food products.

- (b) **Therapeutic methods** — Treatment or treatment methods for acute or chronic health problems of food animals caused by specific infectious or non-infectious agents, parasitisms, chemicals and toxic agents, poisonous plants, injuries and other animal health hazards.

- (c) **Immunization methods** — Vaccines bacterins or other methods to establish or enhance resistance of food animals to infectious diseases and parasitisms.

- (d) **Pest control strategies** — Development of alternative pest control or eradication methods so as to limit the use of and dependence on biotoxic substances. Such alternatives may include biological methods, sterile male techniques, artificial pheromones, and similar strategies.

- (e) **Preventive management** — Development of management methods designed to protect food animals against health hazards.

(f) **Animal health costs** — Development of methodologies to accurately assess economic losses to animal health hazards and to measure economic benefits of alternative methods of prevention and control.

(3) **Aquaculture** — Studies in nutrition, breeding, physiology, management, diseases, and parasite control for fresh water and marine fish and shellfish.

8.4 Air, Water, and Soils

(A) Scope of Research

The objective of this research area is to develop technologies for conserving air, water, and soil resources while sustaining agricultural productivity. This involves developing means to effectively control resources to increase farm and forest productivity as well as the manufacture of resulting commodities.

(B) Suggested Subtopics

Examples of appropriate subtopics for research proposals from small businesses include, but are not limited to, the following:

- (1) Research to reduce losses of soil and soil nutrients or alteration of the physical nature of soil; technologies that enhance soil properties while restricting environmental insults.
- (2) Studies involving reduction of wind-caused erosion of soil; abatement of air pollution stemming from agricultural and forestry enterprises; utilization of air components for agricultural purposes.
- (3) Development of improved methodologies for conserving water resources, restoring water quality, and determining proper irrigation usage to meet current and future agricultural and forestry needs.

8.5 Food Science and Nutrition

(A) Scope of Research

The objectives of food science and nutrition research programs are to develop new knowledge and a better understanding of the characteristics of the foods we eat and their nutritional impact; to apply new knowledge to improve our foods and our diets; and to systematically apply new knowledge to the production of useful new food products, processes, materials and systems, including application of nutritional information to consumer foods and food service systems.

(B) Suggested Subtopics

Research opportunities are many and varied. Areas ap-

propriate for innovative research proposals from small business concerns might include, but not necessarily be limited to, the following:

(1) **Chemistry and biochemistry** — Novel or rapid assay or bioassay techniques for food constituents, nutrients, properties, or interactions. Quality control techniques or rapid methods for in-plant nutrient analyses are needed.

(2) **Microbiology and toxicology** — Rapid, efficient methods for determining presence of organisms and detecting the development of toxic metabolites, including systems for determining shelf-life and "pull date" of food items, are needed.

(3) **Processing** — Methods for automation of processes and tests; rapid analyses and cataloging of physical properties; processing parameters; package design; design of material, energy- and water-efficient processes for small industries; development of specialty products or processes; on-line monitoring and control of nutrient, ingredient, or additive levels.

(4) **Economics and statistics** — Improved sampling procedures for dry mixes; cost/benefit analyses; and modeling systems, including distribution, warehousing and retailing systems.

8.6 Rural and Community Development

(A) Scope of Research

The objectives of this research are to foster, promote, or improve the well-being of rural Americans. The SBIR program supports research on issues and problems related to the development of rural areas, small towns, rural people, rural organizations, and rural institutions.

(B) Suggested Subtopics

Examples of research of interest in this category include, but are not limited to, the following:

- (1) Application of social science principles to processes that promote or foster **development of income or employment opportunities or improvements in services** to rural people.
- (2) Development of **technological or informational systems** to assist local governments or public institutions in rural areas.
- (3) Commercialization of technologies that will provide the foundation for **employment and revenue generating opportunities** in rural areas.

and the other two are the same as the first two, but the third is different. The first two are the same as the first two, but the third is different.

There is a third one, which is different from the first two. It is the same as the first two, but the third is different.

There is a fourth one, which is different from the first three. It is the same as the first three, but the fourth is different.

There is a fifth one, which is different from the first four. It is the same as the first four, but the fifth is different.

There is a sixth one, which is different from the first five. It is the same as the first five, but the sixth is different.

There is a seventh one, which is different from the first six. It is the same as the first six, but the seventh is different.

There is an eighth one, which is different from the first seven. It is the same as the first seven, but the eighth is different.

There is a ninth one, which is different from the first eight. It is the same as the first eight, but the ninth is different.

There is a tenth one, which is different from the first nine. It is the same as the first nine, but the tenth is different.

There is an eleventh one, which is different from the first ten. It is the same as the first ten, but the eleventh is different.

There is a twelfth one, which is different from the first eleven. It is the same as the first eleven, but the twelfth is different.

There is a thirteenth one, which is different from the first twelve. It is the same as the first twelve, but the thirteenth is different.

There is a fourteenth one, which is different from the first thirteen. It is the same as the first thirteen, but the fourteenth is different.

There is a fifteenth one, which is different from the first fourteen. It is the same as the first fourteen, but the fifteenth is different.

There is a sixteenth one, which is different from the first fifteen. It is the same as the first fifteen, but the sixteenth is different.

U.S. DEPARTMENT OF AGRICULTURE
SMALL BUSINESS INNOVATION RESEARCH
SOLICITATION NO. USDA/89-1
PHASE I AND PHASE II
PROPOSAL COVER SHEET

APPENDIX A
 OMB Approved 0524-0025
 Expires 6/90

Proposal No.
Date Received

SUBMITTED BY	Firm				
	Mailing Address				
Project Title					
Topic No. and Area (check appropriate box; see Section 8.0) ☐ 8.1 Forests and Related Resources ☐ 8.4 Air, Water, and Soils ☐ 8.2 Plant Production and Protection ☐ 8.5 Food Science and Nutrition ☐ 8.3 Animal Production and Protection ☐ 8.6 Rural and Community Development					
Amount Requested (\$)	Proposed Duration (Mos.)				
1. The above concern certifies that it is a small business firm and meets the definition as stated in this solicitation (See Subsection 2.2).	<table border="1"> <tr> <td>YES</td> <td>NO</td> </tr> <tr> <td></td> <td></td> </tr> </table>	YES	NO		
YES	NO				
2. The above concern certifies that it qualifies as a minority and disadvantaged small business as defined in this solicitation (See Subsection 2.3).	<table border="1"> <tr> <td></td> <td></td> </tr> </table>				
3. The above concern certifies that it qualifies as a women-owned small business as defined in this solicitation (See Subsection 2.4).	<table border="1"> <tr> <td></td> <td></td> </tr> </table>				
4. The above concern certifies that the Principal Investigator's primary employment will be with proposing firm at the time of any resulting award and during the conduct of the proposed research (See Subsection 2.2(C)).	<table border="1"> <tr> <td></td> <td></td> </tr> </table>				
5. Will you permit the Government to disclose the title and technical abstract page of your proposed project, plus the name, address, and telephone number of the corporate official of your firm, if your proposal does not result in an award, to entities that may be interested in contacting you for future information?	<table border="1"> <tr> <td></td> <td></td> </tr> </table>				
6. Do you plan to send, or have you sent, this proposal or a similar one to any other Federal agency? If yes, give acronym(s); e.g., DOE, NIH, NSF, etc.	<table border="1"> <tr> <td></td> <td></td> </tr> </table>				
PRINCIPAL INVESTIGATOR	AUTHORIZED ORGANIZATIONAL OFFICIAL				
Name	Name				
Title	Title				
Address	Address				
Telephone No.	Telephone No.				
Signature Date	Signature Date				

PROPRIETARY NOTICE (IF APPLICABLE, SEE SUBSECTION 5.4)

U.S. DEPARTMENT OF AGRICULTURE
SMALL BUSINESS INNOVATION RESEARCH

APPENDIX B
OMB Approved 0524-0025
Expires 8/90

PHASE I AND PHASE II
PROJECT SUMMARY*

FOR USDA USE ONLY			
Program Office	Solicitation No.	Proposal No.	Topic No.
TO BE COMPLETED BY PROPOSER			
Name and Address of Firm		Name and Title of Principal Investigator(s)	
Title of Project (80-character maximum)			
Technical Abstract (200-word limit)			
Anticipated Results/Potential Commercial Applications of Research (100-word limit)			
Keywords to Identify Technology/Research Thrust/Commercial Application (8-word maximum)			

*The Project Summary must be suitable for publication by USDA in the event of an award. Do not include proprietary information on this page.

**UNITED STATES DEPARTMENT OF AGRICULTURE
COOPERATIVE STATE RESEARCH SERVICE
PROPOSAL BUDGET**

APPENDIX C
OMB Approved 0524-0022
Expires 8/89

ORGANIZATION AND ADDRESS			DURATION PROPOSED		CSRS Use Only	
			Months: _____		Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)			FUNDS REQUESTED BY PROPOSER		FUNDS APPROVED BY CSRS (If different)	
A. Salaries and Wages			CSRS FUNDED WORK MONTHS			
1. No. of Senior Personnel			Calendar	Academic	Summer	
a. _____ (Co)-PI(s)/PD(s)						\$
b. _____ Senior Associates						\$
2. No. of Other Personnel (Non-Faculty)						
a. _____ Research Associates-Postdoctorate						
b. _____ Other Professionals						
c. _____ Graduate Students						
d. _____ Prebaccalaureate Students						
e. _____ Secretarial-Clerical						
f. _____ Technical, Shop, and Other						
Total Salaries and Wages						
B. Fringe Benefits (If charged as Direct Costs)						
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						
F. Travel						
1. Domestic (Including Canada)						
2. Foreign (List destination and amount for each trip.)						
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of subcontracts, including work statements and budget, should be explained in full proposal.)						
J. Total Direct Costs (C through I)						
K. Indirect Costs (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs included in on/off campus bases.)						
L. Total Direct and Indirect Costs (J plus K)						
M. Less Residual Funds (If applicable)						
N. TOTAL AMOUNT OF THIS REQUEST (L minus M)			\$			\$
O. COST SHARING		\$				
NOTE: Signatures required only for Revised Budget			This is Revision No. ➤			
NAME AND TITLE (type or print)		SIGNATURE		DATE		
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR						
AUTHORIZED ORGANIZATIONAL REPRESENTATIVE						

ORGANIZATIONAL INFORMATION

1. LEGAL NAME OF ORGANIZATION & COMPLETE BUSINESS ADDRESS

NOTE: Submit the following information.
Identify attached information by number and item.

2. Organizational Affiliations — Describe relationship of the organization to a parent organization or to subsidiaries of other affiliates. If the organization is a successor in interest to a predecessor or if changes in organizational affiliation are anticipated, describe briefly.

3. Statement of Purposes and Powers — Attach an official or published statement of the major purposes of the organization as to the powers which have been granted to it to enter into contractual relationships and/or to accept grants, *e.g.*, articles of incorporation, terms of reference, by-laws, etc.

4. KEY OFFICIALS AND AFFILIATIONS

NAME, TITLE, AND TELEPHONE NO.	AFFILIATED WITH:				IF YES IS CHECKED, DESCRIBE AFFILIATION	
	College or University		State or Local Government			
	Yes	No	Yes	No		
Chief Executive		(/)				
Authorized Organizational Representative						
Business Officer						

5. Is your organization currently a grantee or contractor of any component of the U.S. Department of Health and Human Services (formerly Department of Health, Education and Welfare)? This information will assist in implementing certain interagency procedures for which DHHS is the lead agency. ☐ YES ☐ NO

6. If your organization is other than a college or university or a State or local government, attach

- A certified statement of financial conditions (*usually by Certified Public Accountant*) covering at least the preceding 2 years.
- Bank or other references.

7. Assurance of Compliance — Attach completed Form CSRS-665.

CERTIFICATION

1. I certify that _____
(Name of institution or organization) has legal authority to accept grants and the requisite policies, procedures, and personnel to ensure stewardship of Federal funds and management of Federally supported projects, specifically including standards for financial management, procurement, and property management, which meet those described in Attachments F, N, and O to OMB Circular A-110. *(In the event this is not the case, attach a list of exceptions and provide a realistic estimate of when such standards might be met.)*

2. Each proposal to the CSRS Grants Administrative Management office will be consistent with the policies and goals of the proposed grantee and will be submitted in accordance with its procedures and pursuant to appropriate authority.

3. In the event that a grant is awarded as a result of any such proposal, I agree that the proposed grantee organization will:
 - A. Make available the necessary facilities, equipment, services, and personnel to conduct the project substantially as outlined in the proposal or such modifications thereof as may be mutually agreed.
 - B. Conduct such project oversight as may be appropriate, manage the Federal funding with probity and prudence, and comply with all the terms and conditions of the grant.
 - C. Ensure that costs which CSRS is being asked to support are allowable and the treatment of direct and indirect costs in the proposal budget is consistent with applicable Federal cost principles and with the policies of the submitting organization.

Allowable Costs — Payment up to the amount specified in the Agreement shall be made only for allowable costs actually incurred in conducting the work under the Agreement in accordance with its terms.

The determination of allowable costs shall be made in accordance with the following applicable Federal Cost Principles in effect on the effective date of the Agreement:

 - Educational Institutions, OMB Circular A-21
 - Non-Profit Organizations, OMB Circular A-122
 - Commercial Firms, FAR, 48 CFR Part 31
 - State and Local Governments, OMB Circular A-87
 - D. Comply with all applicable laws and regulations.

TYPED NAME AND TITLE OF
AUTHORIZED ORGANIZATIONAL
REPRESENTATIVE

SIGNATURE

DATE

APPENDIX EOMB Approved 0524-0026
Expires 7/90**UNITED STATES DEPARTMENT OF AGRICULTURE
COOPERATIVE STATE RESEARCH SERVICE****ASSURANCE OF COMPLIANCE
with the
DEPARTMENT OF AGRICULTURE REGULATIONS
UNDER TITLE VI of the CIVIL RIGHTS ACT of 1964 (as amended)****NOTE:** Not required if previously submitted to CSRS/GAM.

Legal name of proposed grantee _____ (*hereinafter called the Applicant*) hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964, as amended, and all requirements imposed by or pursuant to the Regulations of the Department of Agriculture, 7 CFR Part 15, Subpart A, issued pursuant thereto, to the end that, in accordance with Title VI of that Act and the regulations, no person in the United States shall, on the ground(s) of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives Federal financial assistance from the Department of Agriculture; and hereby gives assurance that it will immediately take any measures necessary to effectuate this agreement.

This assurance is given in consideration of and for the purpose of obtaining any and all Federal grants, loans, contracts, property, discounts or other Federal financial assistance extended after the date hereof to the Applicant by the Department, including installment payments after such date on account of applications for Federal financial assistance which were approved before such date. The Applicant recognizes and agrees that such Federal assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees.

SIGNATURE(S) OF AUTHORIZED ORGANIZATIONAL REPRESENTATIVE(S)_____
DATE_____
APPLICANT'S MAILING ADDRESS

CSRS-OGPS-GAM-PSU

Room 303, Aerospace Building
901 D Street, S.W.

UNITED STATES

DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C. 20251-2200

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE, \$300